Efficient New-RR Algorithm Based on Scheduling Measures for Improving Real Time Systems

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Abstract- Process management has a unique place among the various OS functions like file management, I/O management, networking, protection system, command interpreter system, memory management. This is because OS is primarily system software, which interacts with hardware during runtime. Different scheduling algorithms are used to manage the processes in the OS. Each algorithm has its own drawbacks and limitations. We need to keep multiple processes in memory simultaneously and exploit the multi programming ability of the CPU. This paper essentially deals with three areas – first, it speaks about the previous CPU scheduling algorithms, second, it proposes a novel scheduling approach, and finally it presents and compares the various results with the conventional round robin approach. In this paper, I proposed a novel approach for the round robin scheduling algorithm, which results in higher CPU efficiency.

Keywords- Time Slice, waiting time, context switches, turnaround time and operating system.

I. INTRODUCTION

Standard and constant time quantum is assigned to each process in the Round Robin Algorithm used for scheduling OS processes. Processes are usually placed in a ready queue, once the burst time is over; the process is removed from the queue. Other processes will be waiting for their turn. Since resources are not available, processes need to wait in the ready queue. FCFS algorithm handles the first process and executes the process fully. SJF algorithm first executes the process with the least burst time[4][5][6].

Operating system's performance is mainly depending upon the CPU scheduling algorithms as to perform multitasking operations. Scheduling plays an important role to assign multiple resources for completing several scheduling activities. We have several traditional scheduling algorithms to make the processes to perform multiple tasks simultaneously [1] [2] [3].

The main objective of the proposed NewRR algorithm helps to improve the scheduling criteria's like waiting time, turnaround time and context switches[7][8].

In this paper, we proposed a specific time quantum, which results in reduced number of context switches, turnaround time and waiting time when compared to the Round Robin algorithm[9][10][11][12].

II. RELATED WORKS

In the recent past, a number of CPU scheduling mechanisms have been developed for predictable allocation of processor. Self Adjustment Time Quantum in Round Robin Algorithm [2] is based on a new approach called dynamic time quantum in which, time quantum is repeatedly adjusted according to the burst time of the running processes. Dynamic Quantum with Readjusted Round Robin Scheduling Algorithm [1] uses the job mix order for the algorithm in [2]. According to [1], from a list of N processes, the process which needs minimum CPU time is assigned the time quantum first and then highest from the list and so on till the Nth process. Again, in the second round, the time quantum is calculated from the remaining CPU burst time of the processes and is assigned to the processes and so on. Both [2] and [1] are better than RR scheduling and overcomes the limitations of RR scheduling regarding the average waiting time, average turnaround time and context switch.

Behera et al. consider the multitasking operating system based on CPU scheduling for real time systems. Proposed two process CPU scheduling algorithm which depends on the scheduling criteria viz., waiting time, turnaround time and context switches. Process gets dispatched to another process based on the CPU requirement and increase order of burst time [12][13][14]. Two processes CPU scheduling algorithm reduce the average waiting time and average turnaround time but context switch scheduling criteria is not considered[15][16].

Above existing survey lacks in providing optimality regarding the scheduling criteria's in which the system performance can be improved further[17][18]. Propose a scheduling algorithm which is suitable for both soft and hard real time systems [10][12][14].

III. PROPOSED MODEL

A. RR with Dynamic continuous varying TQ:

In this algorithm, we have taken n processes P = {P1, P2, P3, P4, P5, . . .Pn}along with the burst time B to create gantt chart to validate the n process response. The main objective of the algorithm to calculate the improve form of scheduling criteria's viz., aiting time, turnaround time and context switch. When the quantum time value depends on the processes availed during the particular time, gradual improvement in the system performance. So, this algorithm

uses average CPU burst time of all the processes is taken as the quantum time for all the processes.

Input: Processes P = {P1, P2, P3, P4, P5, . . .Pn} and their burst time BT

Output: Gantt chart

B. Workflow Process:

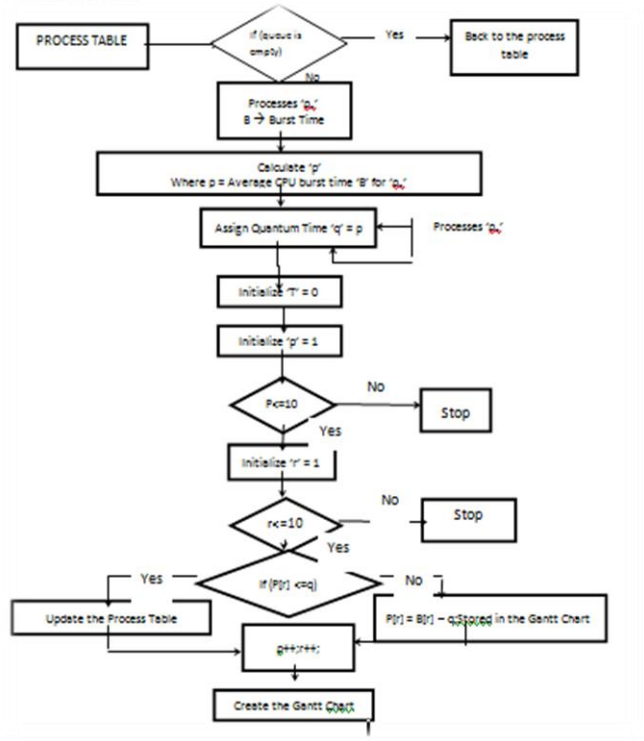

Fig.1: New RR algorithm

The workflow process of New-RR algorithm is represented in Fig.1.

Step 1. START

Step 2. Make a ready queue of the Processes say REQUEST.

Step 3. Do steps 4, 5 and 6 WHILE queue REQUEST becomes empty.

Step 4. Pick the first process from the ready queue and allocate the CPU to it for a time interval of up to 1 time quantum.

Step 5. If the remaining CPU burst time of the currently running process is less than equal half of the time quantum then allocate CPU again to the currently running process for remaining CPU burst time. After completion of execution, removed it from the ready queue and go to step 3.

Step 6. Remove the currently running process from the ready queue REQUEST and put it at the tail of the ready queue.

Step 7. END

C. Mathematical Illustration:

For the mathematical illustration, we have taken '10' processes along with the burst time value.

S.NO	Process Name	Burst Time	Priority	Arrival Time
1	P1	23	1	0
2	P2	75	2	10
3	P3	93	3	15
4	P4	48	6	20
5	P5	2	4	21
6	P6	5	5	24
7	P7	12	7	26
8	P8	20	8	28
9	P9	26	9	30
10	P10	34	10	32

IV. PERFORMANCE ANALYSIS

Based on the analysis, we have compared three algorithms viz., simple RR, DRR, IDRR CPU scheduling with our proposed NewRR algorithm based on the scheduling criteria's such as, Quantum time, waiting time, turnaround time and context switch. Results show that the NewRR algorithm is more efficient in all the scheduling criteria aspects considered above than the existing ones as represented in Table. 1.

Algorithm		Time Quantum	Average Waiting Time	Average Turnaround Time	Number of Context Switches
Simple Round Robin		50	175ms	208 ms	17
New-DRR	Avg.	44,59,55,44,36,33,31	138	193	13
	Min+Max	44,22	155	206	23
	Mdedian	21,19,20	134	192	28
New-IDRR	Avg.	44,59,55,44,36,33,31	126	181	20
	Min+Max	44,22	154	208	18
	Mdedian	21,19,20	112	170	20

Table 1 Analysis based on various scheduling criteria's

V. CONCLUSION

Based on the scheduling system aspects, New RR algorithm is proposed to improve the scheduling criteria viz., waiting time, turnaround time and context switches. Here, we have applied continuous varying dynamic time slice function to

the burst time value to assign priority to the processes, which are taken into consideration. This function is applied to reduce the average waiting time of all the processes in system. Quantum value is equal to the average of all processes burst time value dynamically. Overall performance of New-RR algorithm is analysed against existing simple RR, DRR and IDRR CPU scheduling algorithm with respect to several scheduling criteria like waiting time, turnaround time and context switch.

VI. REFERENCES

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